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# The Chicago Naturalist

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# Weather Beneath the Waves

Frank E. Eggleton

Of all nature's tools, water is the most useful. Mountains are carved by it; valleys are shaped; plains spread out; shore lines eroded, and the whole aspect of the earth modelled and reformed through the agency of this great instrument. Water, when it floats in the atmosphere as clouds, tempers the blazing heat of the summer sun, and it likewise tempers the icy blast of wintry winds when northern shores are bathed by currents from southern seas. Whole areas of the earth's surface are rendered mild and equitable in climate by the modifying effect of great water masses. Deserts bloom when life-giving water is brought to their thirsty soil and irrigation changes barren waste to fertile farm land. In these, and many other ways, water modifies our weather, affects our every-day life, and transforms the earth before our eyes.

No other substance contributes so much to the development of beauty in our world. Clouds furnish the canvas on which the rich pigments of sunrise and sunset are so lavishly spread. Water is the substance of the rainbow, the dewdrop jewel, the beautiful symmetry of the snow flake, and the soft and lovely velour on frosted window pane. Water in one form or another thrills us in the beauty of morning mists rising from valley floors below; in the still, blue-white glory which enchants an ordinary world beneath a full moon of winter; in the soul-shaking thunder of Niagara, the mighty leap of the Yosemite, the wispy drapery of the Bridal Veil; in the broad sweep of the Mississippi; in the restless, boundless, blue eternity which is the ocean; in the quiet mirror of a little lake. Like music, water speaks to us in many voices. Its symphony is scored for many instruments from full-throated organ, through the jar and crash of percussion and brass, to the gurgling wood-winds and the tinkling upper registers of the harpsichord. In cataract, wave swept beach, river, brook, and gentle rain on old eaves we listen to its music and our mood sways with the movements of water's symphony.

Not only does water change our world and contribute much to its beauty; not only is it nature's tool: it is ours as well. Water turns the wheels of industry; lights our homes; floats our commerce; bathes our bodies and washes all of our possessions. It is indispensable in our gardens, our homes, our factories and our laboratories. Of all substances known to man, it dissolves more things which we need to dissolve than all other solvents put together. Not only would our world be greatly different if water did not occur here; life itself could not

exist without it. Small wonder then that water, and the organisms which live in it, should excite the interest of the biologist. This phase of biology, so far as it applies to inland waters, is the province of limnology.

## LIMNOLOGY

One author (Welch, 1935) has stated that limnology is, "that branch of science which deals with biological productivity of inland waters and with all the casual influences which determine it." Other authorities had somewhat the same idea in mind when they referred to its practical, applied side as "aquiculture." It has often been described as the ecology of inland waters, which is just another way of saying that it is the science of relationships of aquatic organisms with all the factors of their environment. And let it be remembered that "all the factors" includes the other organisms as environmental factors. This complete environment has three major aspects: physical, chemical, and biological. Each of these is complex and each is intricately interwoven in the pattern of the fabric which makes up the life of our inland waters.

The scope of limnology is thus seen to be broad and inclusive. To understand the physics, the chemistry and the biology of even one small pond might challenge one's best for many years. Each of these three phases is a great science in itself. Furthermore, we said that limnology deals with all inland waters, great and small, running and standing. Actually there is room for many workers in the subject. Some should be broadly trained and broadly interested, others intensively trained and devoted to some very special branch of the subject. Needham (1916, p. 14), wrote, "The school boy lies on the brink of a pool, watching the caddisworms haul their lumbering cases about on the bottom, and the planctologist plies his nets, recording each season the wax and wane of generations of aquatic organisms, and both are satisfied observers." And again, on page twenty of the same book, he effectively described the breadth of the subject in these words: "Thus the field of operation varies from a wide sea to a single drop of water and the weapons of chase from a harpoon gun to a sterilized needle."

## LAKE TYPES

Inland waters fall naturally into several categories. First, there is the division into saline and fresh waters, but for our present purposes let us omit all further attention to the inland saline waters and leave them, with the sea, for another time and place. The remaining inland, fresh-waters are again divisible into two great types, namely, the *lentic* or standing-water series (lake, pond, bog, marsh) and the *lotic* or

**Fig. 1. The Yosemite's Mighty Leap.**

running-water series (brook, creek, river) naming the kinds of each major type in their genetic order. Lakes, like each of these types, are classified into other groups on other bases. In fact, lakes may be classified on the basis of many different criteria. One of the most useful systems was proposed by Forel and later modified by Whipple (1914) and divides lakes into three types and nine orders. The types are called polar, temperate, and tropical and there are first, second, and third order lakes under each of the three main types. Lake Michigan is a temperate lake of the first order, so are the Finger Lakes of New York, Crater Lake in Oregon and some others in our country. Most of our American lakes of moderate depth are temperate lakes of the second order and our shallow lakes are quite generally members of the third order. This classification is largely on a basis of temperature distribution within the lake. Nevertheless, this one factor of tem-

perature distribution exerts tremendous influence upon the other physical factors and upon the chemical and biological phenomena as well.

Anything like exhaustive treatment of our whole subject would fill a very large volume indeed. Purely in the interest of reasonable brevity, therefore, we shall limit the remainder of our discussion to some of the more generally interesting limnological phenomena as they operate in a temperate lake of the second order. There are literally thousands of this particular kind of lake in the Great Lakes region of North America. Michigan alone is said to have more than 5000 bodies of water which may be called lakes. Minnesota, Wisconsin, Indiana, Ohio, New York, and all the southern provinces of Canada are richly supplied with lakes and in each of these political divisions there are many which would qualify as lakes of the second order.

Before we can clearly define a lake of this sort we must pause to consider one of the most remarkable and important physical properties of that remarkable substance, water. Most liquids steadily increase in density as their temperature is lowered until they finally become solid. But water exhibits the unique property of reaching its maximum density before it reaches the freezing point and transforms into ice. This critical temperature point for water is at 4.0 degrees Centigrade (39.2 degrees Fahrenheit). So important is this one fact that if it alone, of all water's many important properties, were to be suddenly changed to agree with other liquids, the whole course of human civilization would probably be greatly modified. All the polar and most of the temperate type lakes would eventually become solid blocks of ice and only at the surface would there appear a shallow layer of open water during the summer. The lower waters would lie eternally frozen solid. Navigation would cease, fisheries would disappear, bathing beaches would be deserted, and the life of our inland waters as we know it today, would be a thing of the past; gone to join the hairy mammoth, the saber-tooth tiger, and the dinosaur.

Under the Forel-Whipple system of lake classification which we have been using, *Polar Type Lakes* are defined as those whose surface waters do not reach temperatures above 4.0 degrees Centigrade; *Temperate Type Lakes* as those whose surface water temperatures vary considerably above and below 4.0 degrees Centigrade; and *Tropical Type Lakes* as those whose surface waters never become that cool. Further, now, we may say that our temperate lake of the second order, which we are specifically considering, is one whose surface temperature rises in summer to twenty-five degrees Centigrade (77.0° F.), or even higher, and drops in winter to at least zero Centigrade

(32.0° F.); whose bottom water varies in temperature during the year but typically not very far from 4.0 degrees Centigrade; and whose whole body of water is completely circulated from top to bottom twice a year, once in the spring and again in the fall. We may still further characterize our temperate lake of the second order by describing it as medium in size, moderate in depth, and diversified in shore line. Most readers will at once wish to know the exact meanings of such descriptive terms, but it must be remembered that one of the most characteristic attributes of lakes is their diversity. Only in general terms can we describe anything so variable and avoid endless exceptions or countless categories. However, we may have a little private, unofficial, off-the-record, confidential agreement, reader and writer, just here and say in very untechnical terms that "medium in size" means somewhere between, say, one quarter and ten miles in greatest dimension, and that we would think of "moderate depth" as not less than about thirty-five or forty feet nor more than two hundred. Now, don't repeat that!

**Fig. 2. Douglas Lake, Michigan. A Temperate Lake of the Second Order.**

## ANNUAL CYCLE IN TEMPERATE LAKES

No one who lives in the vicinity of the Great Lakes needs to be convinced that our weather passes through an annual cycle with many minor vagaries from day to day. In just the same way our lakes follow an annual pattern. This cycle has three aspects, namely, physical, chemical, and biological. The whole lake cycle, in all its aspects, passes through four *limnological seasons* each year. Chronologically, they are the same as

the four calendar seasons, spring, summer, autumn, and winter, but they have special names. We refer to them as the *spring overturn, summer stratification, fall overturn,* and *winter stagnation.* Each of these limnological seasons is characterized by distinct phases of the annual physio-chemical-biological cycle. Year after year the same succession of events in the weather beneath the waves marks the passage of one season and the arrival of the next.

Our almanac will tell us that the procession of the seasons begins in mid-winter. January is the first page on the calendar. Let us begin the annual cycle of our lake in the same season; only we shall call it winter stagnation. Covering the surface of our lake will be a thick layer of ice and probably over that another blanket of snow. That means that for weeks, perhaps months, the plants and animals must endure a long, cold night. Even a layer of clear ice, with no snow above it, will greatly reduce the effectiveness of the sun's rays. In addition, the solid surface prevents the strong winds of winter from stirring the waters of the lake and dependent thereon a whole chain of events, which begins in the fall with the first permanent ice cover of the colder season, sweeps inexorably forward. The muddy floor of the lake is composed of sand, clay, silt and the only partly decomposed bodies of billions of former inhabitants of the water. Some were large, but untold billions of them were microscopic or semi-microscopic in size. In the aggregate they make a tremendous supply of organic ooze. As further oxidation of this detritus goes on, and as the never-ceasing respiration of the plants and animals which inhabit the waters of the lake and the muds beneath them constantly use it up, the store of life-giving oxygen is depleted. Shut off from contact with the great reservoirs of the atmosphere, the lake's supply of this vital gas slowly nears exhaustion. This happens first at the bottom and in the deeper water, but at times it reaches up to the very top and when the oxygenless zone has progressed to the lower surface of the ice, terrible indeed is the slaughter of the inhabitants. But even when the stratum, within which dissolved oxygen has disappeared, does not extend far up into the lake, waste products of decomposition and of respiration accumulate in the water. This state of affairs can continue for only a limited time, otherwise the lower waters and the basin beneath them will become a veritable biological desert. Indeed, it does just that when this winter stagnation is not relieved by a complete and effective spring overturn.

The mechanics of the spring overturn are dependent in part upon our atmospheric weather, in part upon the important fact that water has its maximum density at four degrees Centigrade. Under the ice,

therefore, the water was coldest at the surface and warmest at the greatest depth. Usually that would mean zero at the surface and about four (both Centigrade) at the bottom (Fig. 3).

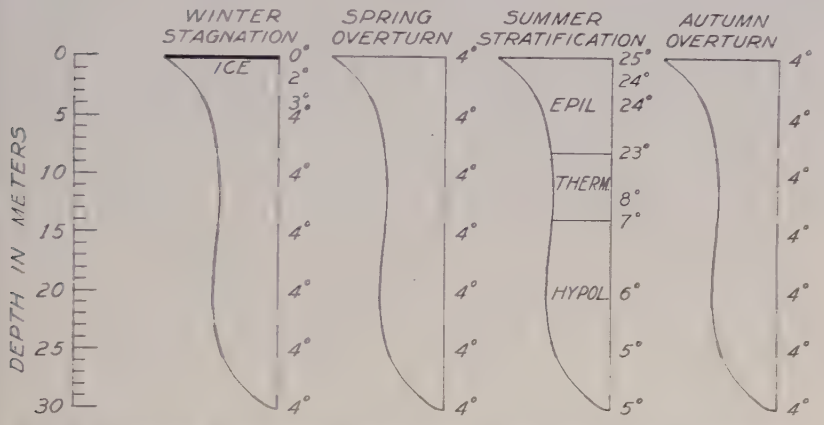


**Fig. 3. Diagram illustrating temperature distribution in a temperate lake of the second order during each of the four *limnological seasons* of the year; winter stagnation, spring overturn, summer stratification, and autumn overturn.**

When the warmer days of spring arrive, the ice melts and the sun slowly warms the surface waters. At the same time high winds of the vernal equinox blow across the open water and, now that thermal resistance to mixing is lessened as the water more nearly approaches a uniform density, surface waters are stirred deeper and deeper. Each day the sun warms the surface layers and winds distribute this solar heat deeper and deeper into the lake, circulating in an ever deepening layer the upper strata of the lake. Eventually the whole body of water approaches four degrees Centigrade, resistance to mixing has largely disappeared, and the whole lake is set into one great circulation which removes the last vestiges of winter stagnation, carries off the decomposition gases, and replenishes the supply of dissolved oxygen throughout the lake. At this time the water is homothermous from top to bottom and as one great limnologist has said, "the lake takes a deep breath."

Profound, indeed, are the biological results of this spring overturn. Plants and animals alike take a new interest in affairs about them. Life surges up and new generations burst forth in every living kind. Population curves swing upward with wild abandon and nature once again demonstrates her tremendous fecundity.

Perhaps the thing which, more than all else, characterizes the annual cycle of temperate lakes of the second order is the nature of their summer stratification (Fig. 4). When the late spring sun grows so intense that it warms the surface layers faster than the lessening force of the winds can distribute the heat to lower layers, the phenomenon of thermal stratification appears. Working together, sun and wind have raised the temperature of the upper third or half of the lake far above the four degrees Centigrade of maximum density. As the temperature of one layer of water goes up the resistance which it offers to being mixed with the cooler layer just beneath increases. Eventually this results in the production of so great a thermal resistance to mixture that the wind can no longer stir the water below that depth. However, the wind, unless it becomes very abnormally gentle and ineffective, retains sufficient power all summer to stir the water throughout the upper levels. Hence the upper stratum of the lake shows a practically homothermous condition. This layer of nearly uniform and warm temperature is followed by a second stratum in which, because the temperature decrease is so rapid with increase in depth, the resistance to mixture is very effective. The result is a virtual blanket shutting out again all contact between the lower waters and the atmosphere, just as did the ice of winter.

These three strata of a thermally stratified lake are called, beginning at the top, epilimnion, thermocline, and hypolimnion. The epilimnion is the upper stratum of circulating water, nearly uniform and relatively high in temperature, richly supplied with dissolved oxygen, constantly relieved of its waste gases, well lighted, and altogether qualifying according to our usual concepts as a favorable place for aquatic life. The thermocline is, by definition, that stratum in which the temperature drops at least one degree Centigrade per meter of increased depth (0.548° F. per foot) (Birge, 1904). Frequently the drop in temperature with increasing depth considerably exceeds that minimum. The sharpest decline yet recorded is said to slightly exceed eighteen degrees Centigrade per meter of depth (9.9° F. per foot), but records of more than seven degrees Centigrade drop per meter of depth are very rare. The hypolimnion is the stagnation zone where, as the summer progresses, dissolved oxygen is depleted, decomposition gases accumulate, the reaction of the water often passes over into the acid side, where light is dim or absent, and pressures are high. Closely correlated with thermal stratification there often occurs a sharp chemical stratification as well.

The biological effect of this summer stratification is often dramatically clear, but not always just what might be expected. Both in the

open water *(limnetic)* habitat and on the bottom *(benthic)* habitat organisms show clear preference for one zone or another. Some of the species of the plankton—the association of microscopic and semi-microscopic, free-floating plants and animals—are excluded from the surface strata and have their maximal abundance at a lower level, frequently within the thermocline, occasionally below it within the hypolimnion (Ward and Whipple, 1918). Others occur in greatest numbers at the surface and quickly disappear at lower levels. Biologically, the lake is also stratified. It is a very interesting fact that under these conditions many plankton organisms, and some bottom-dwellers, exhibit a rhythmic diurnal migration up and down in the lake. Thus the bulk of their numbers will occur at one level during the daylight hours and at quite a different level during the night.

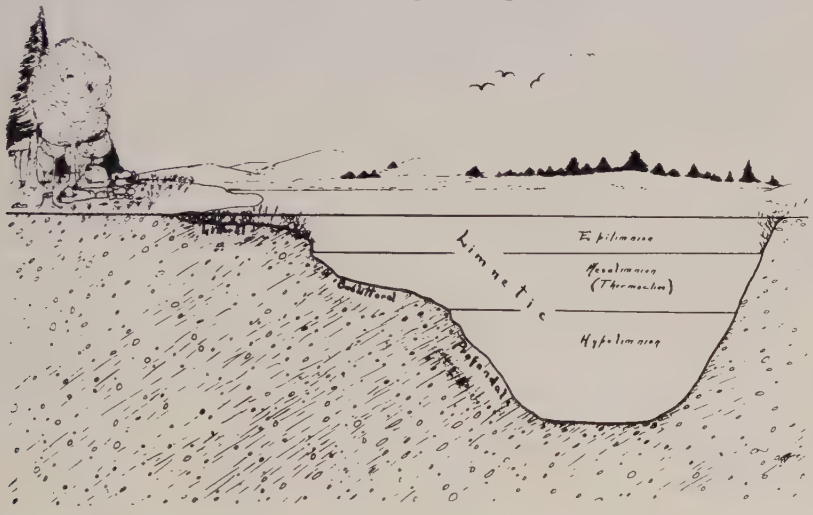


**Fig. 4. Diagram of idealized cross section of a temperate lake of the second order during summer stratification. The three major zones of the benthic (bottom) realm are the littoral, sublittoral, and profundal. The limnetic (open water) habitat exhibits the three strata: epilimnion, mesolimnion or thermocline, and hypolimnion.**

Living in and on the bottom of a lake there is a rich fauna, collectively known as the *benthos*, or as just the bottom fauna (Eggleton, 1931). These animals likewise exhibit sharply defined concentration zones within which the largest populations occur and these phenomena are definitely related to the effect of chemical and thermal stratification of the water.

Autumn brings cooler days and cold nights. The surface waters

are cooled and the rising autumn winds distribute this cooler water downward, lowering the average temperature of the lake in just the same way that the spring winds raised the temperature of the whole body of water. Eventually this process obliterates the thermocline, the thermal resistance to mixing is removed, and the autumnal equinoctial winds set the whole lake in circulation. The lake becomes homothermous at about four degrees Centigrade again, as in spring, and the fall overturn has arrived. Again stagnation is relieved, waste products are removed, the lower waters are oxygenated and the lake takes its second semi-annual "deep breath." Later, days and nights become progressively colder until the upper strata of the lake are cooled below four degrees Centigrade, eventually reaching zero at the surface. The water at four degrees is at its greatest density, therefore heavier, and so sinks to the bottom. The lighter, colder water floats on top. At the last the very surface layer drops to zero Centigrade and ice forms, which being still lighter than even the cold water, remains on the surface. Thus we return to winter stagnation under a new cover of ice and the annual cycle comes to a close.

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## PUBLICATIONS

*"The Museum's publications after all must be our crowning glory, for by them we shall be judged through all time to come. The Museum lives from day to day making its transitory impression on the thousands who come and go—making footprints in the sand. But a publication based on solid, thorough research is something to endure."*—Charles Amsden.

# The Bridge

Samuel A. Harper

Man has built many bridges throughout the world. The most famous ones are noted especially for their engineering triumphs or their architectural beauty. They span impassable canyons in the mountain wildernesses and adorn the noble highways of great cities. They have a place in the history and the legends of many peoples. The names of some of these great bridges are familiar to everyone. They are regarded as notable achievements of our so-called civilization.

But I know a bridge which is greater than all these. It is only a rod long and spans a quiet little creek about twelve feet wide. An old country road wanders idly down the gentle hillside, and reaches timidly out into the marsh, and the little bridge helps it across the stream. Holding it closely for the moment, it soon releases it to the high ground beyond, where it resumes its wandering way among the hills. This winding road and little bridge divide a wide marsh which lies between two small, unpretentious lakes of sparkling beauty. The meandering creek, which links the two lakes, like crystals on a silver string, divides the marsh in the other direction. Thus the little bridge stands at the very center of one of nature's own museums, unroofed and open to the sun, and flooded with vital air.

As it rises to span the creek it is a platform from which one may view the world! It is like an open door to the museum of nature.

Following the sleepy road as it entered the marsh, I found the cattails vocal with the fluting of the redwings, and the chatter of the marsh wrens. Many rosy-epauletted blackbirds swayed on the tips of the tallest rushes, clinging with claws and tail to the slender stems, while fluting their musical "O-ka-lee" to the wide world. But the timid marsh wrens, though equally voluble, hid themselves and their prattle away in the marshy thickets and were not so easily seen.

The long-billed marsh wren is one of the most active, nervous, excitable bits of feathered life one ever sees. His song is a ripping, rollicking one, typical of this family of interesting little birds.

As I loitered on the little bridge I watched intently the spot in the deep marsh whence the chattering song of one of these little marsh wrens came, unable to catch sight of the little reed-colored bird. Then suddenly he tumbled up into the air over the rushes, and as suddenly tumbled down again out of sight, accompanying these aerial stunts with his rippling, bubbling, gurgling song. A little later he stealthily crept up to the tip of a reed stem, and, throwing his head back and his stubby tail straight up, sang until his whole body shook with vibrant ecstasy.

The marsh all about was noisy with the chatter of these birds, some staccato notes near by and others distant and scarcely audible. Most of the birds were hidden, however, by the dense cover and their protective coloring. A few of their globular nests were visible. They were composed of coarse grasses and cattail leaves, and strapped with the same materials to the rushes or other marsh stems, and each had its little round entrance at the side.

As I leaned on the slender railing of the bridge, blue-backed and chestnut-throated barn swallows darted under the bridge and out again as they visited their mud nests which were attached to the girders supporting the bridge. After a momentary shyness, due to my presence, the birds darted in and out freely, directly under my feet, sometimes flying so close that the rush of air on their wings was distinctly audible. They sailed gracefully in, out, over and under, like a swarm of giant insects.

This little bridge, and the diminishing few like it, are the favorite nesting sites of swallows and phoebes. Before the days of the automobile and the wide concrete highways, hundreds of these little wooden bridges throughout the country sheltered the phoebes' nests. These simple bridges did not interfere with the native plant life along the streams. Attractive cover and feeding grounds for the birds were near at hand. The wooden girders were natural resting places for the mud nests. Now all this has been replaced by forbidding stretches of concrete, in the building of which all the bordering vegetation has been scraped away. The swallows and phoebes have lost most of their old bridge-sheltered homes. And so I was thankful that the winding country road had led me to one little bridge that had survived the age of gasoline tax and highway bonds!

The little creek flowed slowly and softly between its marshy banks. As I leaned over the bridge rail and peered into the water's quiet depths, several black bass and a few smaller fish floated down into the shadow of the bridge.

I looked up stream again just as a muskrat turned the corner of a protruding cluster of cattails. He was swimming fearlessly down stream toward the bridge. As he came near, however, he dove and swam along directly under me close to the gravelly bottom of the creek. As he swam on the surface approaching me his fur coat appeared almost black, but under the water below me he seemed to have changed it for a coat of gray.

Turning my back to the bridge rail, I raised my eyes to the hills whence the road had come, and there on the sloping hillside a scattered flock of white sheep nibbled at the green grass. Presently across

my vision appeared the outline of a bittern, whose lumbering flight brought him across the road into the marsh beyond. He alighted in the protecting reeds and rushes, and immediately pointed his long bill straight upward simulating the brown marsh stems around him, so that he would have been wholly invisible to any one who had not seen him alight. I watched him for several moments with my glass and he remained as motionless as the marsh grass which so effectually hid him.

In the meantime a kingbird had perched upon the single telephone wire which stretched across the creek above me. Following his usual custom he darted out from his perch every few moments in tyrannical pursuit of insects, and after snapping one up in his bill he would return to the wire until some other dainty winged creature fluttering in the sunshine tempted him to repeat the performance.

The gurgling note of a blue bird was occasionally heard overhead, and the musical "per-chic-o-ree! per-chic-o-ree!" of a goldfinch, as he undulated across the sky.

Walking to the end of the bridge I discovered a small snake sunning himself in the road. Although travellers were few along this country highway, his position seemed unnecessarily hazardous, so I woke him from his nap, and he hurried down the grassy bank into the creek, and swam off among the rushes.

Turning my glass once more upon the spot where the bittern had alighted in the marsh, I found him still standing quietly with bill erect, in statuesque fashion. While watching him, a sora rail whinnied from his distant covert in the thick marsh.

As I reluctantly left the bridge, and followed the road to the edge of the marsh, I surprised two Bobwhites feeding by the roadside. They scurried through the fence into the meadow where the sheep were still grazing.

There is much undiscovered country of great native beauty and interest near at hand, and we miss rare bits of inspiration by making long jumps to more noted and better advertised wonders. After doing so we often find to our chagrin that we have sought extravagant and fantastic forms instead of mere beauty, of which there in an abundance in our own neighboring fields.

Delightful experiences, such as came to me this day, are offered by this little country bridge to all who pass that way. One may not see so much of the world of reality from London Bridge or Ponte Vecchio. Little streams of pure water, such as this, if often visited, help us to keep the springs of life unpoisoned. With eyes that see and ears that hear, these simple scenes emancipate the spirit and bring to one a sense of kinship with everything that shines and lives.

# Tropical Fish

## HOW TO SET UP AND MAINTAIN AN AQUARIUM

WALTER ROGERS

With photographs by courtesy of John G. Shedd Aquarium

The tropical fish hobby that has been gaining in popularity for the past ten years now comes into its own and takes its place as one of the foremost and interesting hobbies of all. Twenty-five years ago when rare fish sometimes cost as much as two hundred dollars apiece, this was a hobby exclusively for rich men, but in the ensuing years breeders and importers have succeeded in lowering prices to such an extent that everyone may enjoy these beautiful pets.

Today many doctors, dentists, hospitals, and schools have aquariums that are beautifully planted with rare aquatic plants and are stocked with multi-colored fishes from all over the world. Sometimes doctors recommend aquariums as a means for complete relaxation for nervous patients. That is not difficult to believe when one realizes just what happens in an aquarium. In one corner a female with her newly-born babies around her is guarding them from harm; in another part of the tank a beautifully colored male is courting a female, and their antics are enough to keep even the most blasé spectator on edge to see what happens next. These and many other interesting things are part of the daily life of the tropical fish; twenty-four hours a day, seven days a week, they are on hand to parade their home life before your eyes, for unlike other pets, fish never sleep.

In selecting your aquarium, the size and quality are important factors. A better type of aquarium is cheaper in the long run as it is to be your fishes' home for a long time. Sizes range from one to one hundred gallons, but since a one-gallon tank only holds five fishes at the most, a ten-gallon is considered the most appropriate size for the beginner for it will comfortably hold ten pairs of fishes of average size.

Next we need sand. This is very inexpensive and is available in a wide variety of colors. Let us assume we will use brown sand. For a ten-gallon tank we will need twenty pounds, figuring two pounds to a gallon. Never use beach sand; it is not practicable for it must be cured and treated before using it in an aquarium, and in view of the low cost of purchasable aquarium sand this is not worth the trouble.

The most popular and most suitable plant for aquarium purposes is *Vallisneria*. This is a beautiful plant with long leaves, which will propagate rapidly. About two dozen plants, arranged in the rear of the aquarium, will provide a green background which will enhance the beauty of the fish. Other popular plants are *Cabomba, Ludvigia,*

*Anacharis*, and *Sagittaria*. These plants can be arranged according to individual tastes.

The best location for the aquarium is in front of or close to a window where the sun will shine on it for at least a few hours a day. Sun-light is beneficial but not necessary if you have artificial lighting which can be obtained with electrically lighted hoods or with side reflectors. Top-lighting is preferable because it stimulates plant growth to a greater degree and because it reveals the beauty of the fish more than side-lighting. Without sunlight, several hours of artificial lighting are needed daily.

**Rasbora.**

Rinse the sand thoroughly before using, because it picks up dust enroute. Unwashed sand is not harmful but may cause the tank to be cloudy for a while. After the washed sand is placed in the aquarium, fill the tank half full of water. In arranging the plants, the taller ones such as *Vallisneria* are placed along the back of the tank, half an inch apart. In planting, grasp the root of the plant with thumb and index finger and push it gently into the sand. Be careful not to plant too deeply, as roots may choke and rot.

After the aquarium is planted, cover the surface of the water either with newspaper or waxed paper and then pour water gently over the paper until the aquarium is full. This procedure will prevent the plants from being uprooted and the sand disarranged.

A newly planted aquarium should stand at least two days before fish are introduced. It is well during this period to leave the light on as much as possible so that plants may take root. Avoid fresh tap water and water that is too cold.

The following tropical fishes are among those which may be kept together in the ten gallon tank.

### GUPPY

The guppy, one of the most hardy and prolific of all tropical fishes belonging to the live-bearing family, is known almost to everyone. It will breed anywhere, even under difficult conditions, bringing forth its young about every six weeks. As in most tropical fishes, the males are the more beautiful. They are extremely variable and, of all the millions that have been sold, there have probably never been two exactly alike. The females are much less brilliant, a rather drab olive with a green iridescence. They grow to a length of two and a half inches while the males seldom exceed one inch. In buying live-bearing fishes it is best to have two females to one male.

### BLACK MOLLIE

The male is jet black with golden eyes and a beautiful sail-fin; it ranges from one and a half to two and a half inches in length. The female is also black, but not quite as striking as the male, and reaches a length of two to three inches. This species also breeds quite readily in almost any tank.

### THE PLATY FAMILY

The fishes of this group are of many beautiful colors: black, green, gold, and red. The red platy is a graceful, showy fish, very popular among fanciers. The male is about an inch long and the female an inch and a half.

### BLACK TETRA, AND ITS COUSIN THE RED TETRA

These fish look somewhat alike except for coloring, the black tetra being silver with jet black fins and the red tetra being silver with brilliant red fins. Both fish are ideal for aquarium life and are hardy and peaceful. They average an inch in size.

### ZEBRA FISH

These fish are ideal for any aquarium, being hardy and striking in color. The back is greenish, the sides blue with six golden stripes running horizontally along the body. They are fast swimmers, usually staying near the top. They range in size from three-quarters of an inch to two inches.

RASBORA HETEROMORPHA

This is the most beautiful of the Rasbora family, deservedly having the title "Queen of the Aquarium." The body is silvery white, glistening blue and pink, with the rear part and all fins pink, and a blue-black wedge-shaped spot on either side starting at the middle and ending at the tail. Size is usually from one to one and a half inches.

**Tetra.**

Since no aquarium is complete without a scavenger to take care of the waste matter and excess food, it is advisable to have some of the South American catfishes. Two of the most popular are the:

CORYDORAS AENEUS AND CORYDORAS LEOPARDUS

The former has no common name but the latter is called the leopard catfish. The members of this family, oddly enough, are known as the only fish that wink. Watching them as they scurry along the bottom in search of food, you will see a very definite wink. The *aeneus* is golden brown and salmon pink along the bottom of the body. The leopard has spots—hence the name—and three black lines along the top near the dorsal fin. Both range from an inch and a half to four inches.

That completes the ten gallon tank. It should be a beautiful and

interesting addition to the home and will give you many fascinating hours.

The only care needed now is the feeding of the fishes every day. Just a pinch of food is all they need. You can obtain tropical fish food at the place where you buy your tropical fish. Get several kinds and alternate in feeding. This will provide a change for the fish. Please try not to overfeed the fish, and do not feel sorry for them and think they are not getting enough; they eat the small bacteria and vegetable life in the tank. Overfeeding sours the aquarium water and causes it to become cloudy.

**Corydoras.**

Once a week it may be necessary to add a small amount of water to make up for that which has evaporated. This water may be drawn from the tap, but make sure it is the same temperature as the aquarium water. Adding cold water chills the fish and causes them to get *Ick or Ichthyophthiris*. This is noticeable by the appearance of white spots on the sides of the fish. It is highly contagious and unless checked will spread to all the other fish. If this condition appears in your tank, while not deadly, it is serious and should be treated immediately. To do this raise the temperature of the water gradually up to eighty-five degrees, and use one of the several good remedies on the market. Use according to directions, and in twenty-four to forty-eight hours your fish should be well again.

# A Day on Mount LeConte

W. J. Beecher

Six thousand feet on Mount LeConte in the Great Smoky Mountain National Park of Tennessee! The gloomy trail wound upward through an ancient, rain-sodden spruce-fir forest—bending around great mossy blocks of granite—skirting vast chasms that yawned into the valleys below. Thin ghosts of clouds drifted through the dark trees now and then, and all vistas melted into the shadowed gray of a typical rainy day in the southern Appalachians. Only the previous evening I had arrived with the Northwestern University-Chicago Academy of Sciences field party which I had been invited to join as mammal collector. Soft from university work, my legs now ached so that the mere effort of raising them caused the thigh muscles to nearly bind at each step; the pack of mouse traps had been cutting my back for several miles. Doubtless I muttered to myself, as I went, about the miserable weather. . . .

Half an hour back Don Lowrie, of the Chicago Academy of Sciences, and I had crouched shivering in the half-shelter of a granite overhang and decided to part company—he to return over the long trail to the cabin in Greenbrier—I to struggle on the short distance to the top. We had set an ambitious pace just after breakfast, up through the magnificent hardwoods of the cove in which the tiny shack community of Greenbrier formerly lay buried. High humidity is characteristic of this steaming south-eastern cradle of the North American deciduous forest, and we soon worked up a thorough lather. All along the sun-bespangled path massive yellow poplars and hemlocks, springing from the tangled debris of the steep slope, thrust upward over a hundred feet into the light. Everywhere moss-grown monarchs of a past dynasty lay mouldering into ruin. Here in this virgin forest retreat birds were abundant and in full song. As one progressed upward, the Carolina wren and indigo bunting of the coves gave place to the ovenbird and wood thrush of the deeply shadowed beech and hemlock glens bordering the many streams. At noon we had passed Trillium Gap where the beech forest creeps out of the cove onto the saddle-back between Brushy and LeConte Mountains. Then, halfway up the remainder of LeConte it had begun to rain, ruining the prospect of spider-collecting for that day, so Don had started back. As for myself, returning to the cove with a load of mouse-traps and other equipment seemed impossible. Besides, if a spark of enthusiasm yet burned, it was to set those traps that night in the spruce-fir forest atop LeConte for the very desirable red-backed mouse, *Clethrionomys carolinensis*.

The rain fell with a steady monotonous rustle; except for the splashing of my feet, the only sound. It was chilly at this elevation and, dressed for the lowland heat, I was soaked through. The immense Fraser's firs that had earlier awed me seemed commonplace now, and their tops were more frequently lost in an unearthly swirl of clouds. I wondered if Don had been sure about there being cabins on the summit. What would I do if there were not? Make a lean-to maybe—and eat the mice I caught! The idea amused me and I remembered a story about someone eating type specimens of frogs. Then I crossed a rivulet, turned a bend and found myself all at once on the edge of

**View of Mount Leconte.**

a clearing. Beyond rose the last conifer-serried slope to the crest, but it was the group of low cabins directly in front that held my glance. Everything seemed to have changed in the space of a few seconds. Carolina juncos were trilling in chorus and a robin flew up from a small lawn; even the clouds had lifted temporarily, and it was not raining so hard.

A tall, spare man hailed me from the door of the largest cabin—Jack Hough—famous keeper of the LeConte lodges, I was soon to learn. It was hardly necessary to tell my story; the park naturalist

had informed him about the University party in Greenbrier, and I was expected. He left me in a clean cabin with a log fire sputtering in the fire-place, and I felt my spirits rise as the heat soaked in; my legs, after being relaxed a short while no longer behaved so disgustingly. At all events, I was here. Somehow that was very satisfactory, and I did not envy Don somewhere along the back trail.

The rain continued, and late in the afternoon more guests arrived, coming up the regular trail from Gatlinburg—two newly married couples and a pair of strapping Canadians. I particularly admired the latter for their quiet good nature—pipe-smoking outdoor chaps with a keen appreciation of things about them. I learned they had spent the previous summer in the Rockies and found the climbing here pretty tame. But they laughed with me when I dared them to leave the trail and ascend next time through the "green hell" of the rhododendron thickets. Even the black bears find use for the trails now.

With the light beginning to wane I set out to lay the trap line, taking precautions to shelter the sets against being rain-sprung. It was unnecessary to go far. Just beyond the clearing the forest closed round again, and in the halflight several series of traps were laid along the abundant windfalls and under stumps.

Night comes down quickly in the Smokies, particularly on a rainy day. When the job was done I found myself in nearly total darkness without a light, and it took some time to back-track my course from the cabin by means of trap markers.

The evening meal was already well along, and I endured a friendly joshing for my tardiness. They were all very much interested in what I was doing, and wanted to know all about collecting and museum work. Waxing enthusiastic, I colored it as highly as possible, purposely choosing the best points. So the evening passed, the log fire sending a great stream of sparks up the stone chimney in defiance of the rain. The Canadians recounted their adventures in the West, speaking with the smooth, rapid flow of words I have noted in other Canadians of English extraction. Nothing was too small to be discussed—the night raids of bears—the rattlesnake abundance down Greenbrier way. . . . But the talk lagged at length, and all retired to the excellently accommodated rustic bed-steads arranged, berth-style, in side rooms. I remember drawing a very brief comparison of the resilience of these beds with the board floor of the cabin in the brier before going to sleep.

The sky was just beginning to grey when the junco chorus roused me. My Canadian friends were already astir, bound for the top to view the sunrise before breakfast. I was soon abroad in the cool forest, all eagerness to behold the result of my efforts, but with a certain schooled pessimism that is recommended as a protective mechanism

against the shock of disappointment. I had not been in a condition the evening previous to appreciate how remarkable the top of LeConte really is. Mosses of great variety carpeted everything to a thickness of several inches; even the stunted firs bore a veritable moss and lichen flora on trunk and branches. Moisture still dripped from everything, though the rain had ceased; for the air in these summit forests is perpetually saturated, the official psychometer registering 100 per cent humidity. And once it is understood that the rainfall here reaches 100 inches a year, there becomes evident a striking superficial resemblance to the cloud forests of Guatemala.

It was in such a setting I viewed my first red-backed mice, sharply set off against the verdant moss. Quite beside myself I merely squatted there gloating for a time before touching them. Pretty little fellows —a half dozen of them—and several of the little dark cloudland deer mice, *Peromyscus maniculatus nubiterrae*. . . . What do we know of the swift ebb and flow of forest life between dusk and dawn? This is the question the mammal collector asks himself in the dewy chill of the morning, and it never fails to intrigue his fancy. . . .

That was the climax. Afterwards I watched for an hour from the summit of LeConte while the great rafts of clouds swept in misty procession over the coves below. The sunrise was obscured, but occasionally the clouds would pinken a little as they rolled by—and once the sun struck through to the lowland hardwoods, setting off their lighter green. From darkly-shaded glens far below, where the rhododendron crowds along the steep course of a rushing torrent, the bell-like chiming of the wood thrush came up to me—a vocal expression of the primeval forest.

Altogether, it was very strange to me like all this strange country. There is nothing about the depth of these coves as impressive as the awful chasms of the West; geologically these mountains are very old and in a late stage of leveling. But the tropical exuberance of the vegetation, climbing as it does over everything, is striking. And this flora itself is very ancient, dating back millions of years to the Tertiary period. Out of this vast center of dispersal has come the deciduous forest of North America and the greater portion of the mammal fauna, radiating northward in the wake of the glaciers. The smoky haze that hangs over these mountains is symbolic of this great antiquity. In a sense it is like being at the venerable shrine where a world began—and in this strange, lush garden much of our present North American natural world did begin.

After breakfast I shook hands with my friends, shouldered my pack and started down the mountain through a forest that glistened in the morning sun, vowing that if nothing else happened my adventure on Mt. LeConte had been a memorable one.

## Some Memories of a Palaeontologist

By William Berryman Scott

Princeton University Press. 1939. 336 pages, 1 portrait. $3.00.

There are times when the benefits of endowed University Presses are forcefully brought to mind. Certainly the profit criterion is a poor one to determine whether or not a book should be published, but it is necessarily the criterion of all commercial presses. The Princeton Press also has published many volumes with exceptionally high sales-value; they are to be congratulated on publishing the present volume, even if it were published primarily as an item of Princeton history!

So many people in Science are merely names to us. Dr. Scott was merely a name to me: the author of the most excellent book on mammals, *A History of the Land Mammals of the Western Hemisphere,* which had aroused my appreciation and curiosity about him. Needless to say, Dr. Scott, the man, is brought out in this autobiography. That is enough in itself.

His seventy-year connection with Princeton, watching and helping the growth of a major university; his expeditions to the western states, from the time when Indian fighting on the western plains was a necessary adjunct of fossil collecting, to the present; his student days, philosophy, and political leanings—this is only a part of the "memoirs," for intermingled with these, one finds brought to life many of the prominent names in science in the latter part of the last centrury. As Dr. Scott's teachers or colleagues, one sees in Europe such men as Huxley, Balfour, Gegenbaur, and Gadow, and in America such leaders as Guyot, Leidy and Cope, as well as present American workers. The always interesting Cope-Marsh controversy is given another airing, with less attempt at "white-washing" than in other works.

A comprehensive index makes it an important contribution to the history of science, and especially to the personalities of scientists.

—W. L. Necker

## Wild Bird Neighbors

By Alvin M. Peterson

Bruce Publishing Company, Milwaukee. 1940. 283 pages, illustrated with photographs. $2.00.

This book may be enjoyed by young and old as an introduction to bird study. Although Mr. Peterson gives no reference as to the setting, his book is apparently concerned with mid-western birds of which he describes thirty-two species and discusses their general habits. There is no preface or introduction, but the book is beautifully illustrated with 104 photographs. He gives details regarding the economic value of birds and their conservation. It is interesting to note that the author does not condemn crows, jays, and hawks which have been maligned more than research indicates they should. Obviously he is a careful observer, thoroughly familiar with his subject together with being an excellent photographer. His accounts are colored with personal experiences.

—Earl G. Wright

## The Travels of William Bartram

Edited by Mark Van Doren

Facsimile Library, Barnes & Noble, Inc., N. Y., 1940. 414 pages. $2.75.

One hundred and fifty years ago a book was published in Philadelphia under the long and cumbrous title *Travels through North & South Carolina, Georgia, East & West Florida, the Cherokee Country, the Extensive Territories of the Muscogulges, or Creek Confederacy, and the Country of the Choctaws, containing an account of the soil and natural productions of those regions, together with observations on the manners of the Indians.* Within ten years the book was not only translated into French, German, and Dutch, but at least eight separate editions appeared. In spite of all this, it has for many years been a much cherished collector's item, available in only a few public libraries. Now, admittedly, there are many "collector's items" which practically no one would care to read, much less get pleasure out of reading. Not so with William Bartram's *Travels.* They are alive with the thrill of nature. They breathe the air of discovery. They live.

I open the book at random, to give you a taste of his style: "How harmonious and soothing is this native sylvan music now at still evening! inexpressibly tender are the responsive cooings of the innocent dove, in the fragrant zanthoxylon groves, and the variable and tuneful warblings of the nonpareil, with the more sprightly and elevated strains of the blue linnet and golden icterus: this is indeed harmony, even amidst the incessant croaking of the frogs: the shades of silent night are made more cheerful, with the shrill voice of the whip-poor-will and active mock-bird."

Bartram was a naturalist in the highest sense of that word. Nothing was beneath his notice. Not only the plants, which were the reason for his travels, but also the animals, Indians, settlers, scenery—the feel of this nation in its adolescence—are treated in his delightful style throughout the book. It is a source-book for the naturalist, the anthropologist, the historian—and still it is one of the most readable books which I have ever had the pleasure of reading and re-reading.

The publisher has done a service to American science and history in reprinting this admirable book. In the way of criticism, we regret that no maps or plates are included, and that the index is insufficient. Nevertheless, we heartily recommend that the next time you think about buying a "nature" book by a current favorite, you get a copy of Bartram's *Travels* instead. I know you will at least admit that it is as good as any modern book, and I strongly suspect that you will find it much the better.

—W. L. Necker

## American Mammals

By W. J. Hamilton, Jr.

McGraw-Hill Book Co., N. Y., 1939., xi, 434 pages, 92 figures, $3.75.

Descriptive books of many groups of American animals are constantly being published which repeat, in slightly different words, the general appearance and range of individual animal species; habits, regrettably, are but seldom given to any extent in such books. The volume under discussion, however, makes an excellent companion to any manual on mammals, since it treats the *habits* and mentions species under habit headings. Naturally, the limitations of space are great, but considering these, the book is excellent. A listing of chapter headings may be the best way to give the cope of the book: ancestry of mammals, classification, characteristics of mammals and their uses, adaptations, food; storage, reproduction, the home of mammals, hibernation, migra-

tion, population, behavior, distribution, useful mammals, injurious mammals, game mammals, and predatory mammals.

The style is very readable; the physical qualities of the book are of the usual high McGraw-Hill standard; the only disappointing feature is the illustrations, the drawings particularly being generally mediocre. We trust that these will be improved—a relatively easy task—in the second edition which undoubtedly will be required soon. —W. L. Necker

## Our Small Native Animals, Their Habits and Care

By Robert Snedigar

Random House, N. Y. 1939. [x], 308 pages, 32 illustrations. $2.50.

Do you keep wild pets? If so, this book is indispensable. Not only does Mr. Snedigar discuss the habits and manners of over a hundred different animals which he has kept in captivity, but he gives many invaluable hints to the would-be home zoo keeper. By no means the least important are the directions for keeping and raising nine kinds of live food.

Over sixty pages are devoted to mammals; birds, most of which are legally protected against caging, get twenty-six; amphibians fifty, and reptiles 130. Hints for the construction of cages, terraria, etc., are interspersed throughout. The section on diseases and parasites of reptiles is especially excellent, although, perhaps, alternative medicaments for each disorder could have been given, such as atomidine (with which we have had excellent results) in place of camphenol for fungus diseases and canker. Possibly one type will prove to have certain advantages over another in definite cases. Comparative experiments in some of these remedies should be carried out by the amateur zoo keeper.

The keeping of wild animals is a never-ending study. Not only are there always new kinds of animals, but individuals of the same species differ as much, if not more, than human beings. All bring up new and novel problems. No matter how well-versed you may be in making wild animals feel at home in a cage, the experiences of others can always add to your knowledge—so with this book, by one who has kept animals not only as a hobby, but also as part of his museum duties. It is excellent, not only for the beginner, but for all who aspire to keep wild pets.

I want to make note particularly of the remarks which Mr. Snedigar makes about keeping animals which in no sense will ever be "pets." He mentions shrews, for instance. These, like most of our native animals, are but poorly known—they could never be petted like a squirrel—but by keeping them in captivity you can learn much about their life habits, much new to science and exceedingly interesting to you. This is true of practically all our animals. Keep extensive notes on everything your zoo-inmates do; consider nothing too insignificant or well-known. Make your own notes into a continuation of this book, as the author suggests in his "conclusion."

—Walter L. Necker

## The Spider Book

By John Henry Comstock. Revised and edited by W. J. Gertsch

Doubleday, Doran & Co., 1940, xi, 729 pages, 770 figures, $6.00.

Comstock's *Spider Book* has been the stand-by for amateur and professional since its original publication in 1912. The new edition, revised by the able hand of Dr. Gertsch of the American Museum again makes the volume available, and at a surprisingly low price for a book of this type.

—W. L. Necker

# NOTES FROM THE FIELD

## The Food of Captive Green Snakes

One of the most difficult snakes to feed in captivity, even in the summer when all the common snake food is readily obtainable, is the smooth green snake, *Opheodrys vernalis*. Although I have kept many of these snakes for a time as pets, until the past fall I have been unable to find anything that they would eat readily. After trying many kinds of insects, worms, and other invertebrates, I chanced to place a grasshopper of the common genus *Melanoplus* in the grass snake's cage, never thinking that the snake would attempt to catch such an active and powerful jumper.

Next day I noticed that the grasshopper was gone. Several more were placed in a small glass jar with the snake. After the grasshoppers had quieted down somewhat the small snake began to stalk them. It made no attempt to strike until it was within one or two inches. Then striking very clumsily, it missed by a wide margin. When the insects quieted again the performance was repeated, this time with better results. Although the snake seized the grasshopper, it was unable to swallow the insect and finally released it. After missing its prey by wide margins on two successive strikes, the snake finally managed to catch a grasshopper by the tail. Swallowing it successfully without much difficulty, the snake promptly ate four or five more before being satisfied.

Since then I have seen this performance often. The snake always seems to have poor judgment in striking and often takes hold of its prey in the wrong place. Evidently it cannot manage to swallow a grasshopper unless held by the tail or head, for in any other position the insect's powerful legs enable it to break loose. However, the snake seems to make up in persistency what it lacks in accuracy. The grasshopper may be the green snake's principal article of diet in nature for every one that I have observed refused all other food.

—Chester V. Wickware.

*The smooth green snake is also known to feed upon spiders, crickets, and hairless larvae of butterflies and moths.*

*—Ed.*

## Germination of Old Seeds

Some time ago I had occasion to remount a skin of an Australian musk duck *(Bizuria lobata)*—a large species something like our common ruddy duck in appearance. The bird was collected and originally stuffed in 1853. The stuffing was Java Kapoc *(Ceiba pentandra)* with the seeds still in the silky fibers.

Having heard of the germination of seeds from old Indian crypts, I wondered whether these seeds, which were certainly not in the most favorable environment, would germinate at all. I planted twelve of the seeds in a flower pot in the museum laboratory which already had a corn plant growing in it. Three months later all twelve had come up in spite of the dark exposure! In two months more they were four inches high although each only bore two leaves. They were then transplanted to my father's greenhouse at Delavan.

—Thurston I. Wright

*(Continued on page 62)*

# MUSEUM ACTIVITIES

## The Offield-Beaty Arizona Expedition Is in the Field

The Academy's second Arizona expedition, announced in the last number of the Naturalist, is now actively in the field in the vicinity of Superior, Arizona. Dr. Gloyd, D. C. Lowrie, E. G. Wright, and T. I. Wright left Chicago on the seventh of May and will shortly be joined by Mr. and Mrs. John Y. Beaty. The party plans to return to Chicago about the first of July.

## Rattlesnake Monograph Is Published

Dr. Gloyd's monograph, *The Rattlesnakes, Genera* Sistrurus *and* Crotalus, *A Study in Zoogeography and Evolution,* is off the press as Special Publication Number Four of the Academy. It contains more than 300 pages, 10 figures, 22 maps, and 31 plates, and costs $2.50 postpaid. Life, Contributing, and Sustaining members may obtain one copy free upon request. Associate members receive a discount of twenty percent.

## The Library

The library has received many most useful items since the last report. Essentially complete sets of their scientific publications were donated by the following institutions: the New York Zoological Society, the United States Biological Survey *(Wildlife Review),* the University of Colorado, and the University of Utah. The following sent part of their respective publications: the Academy of Natural Sciences of Philadelphia, the Elisha Mitchell Scientific Society, and the Illinois Academy of Science.

Useful contributions were received from the following individuals: Miss Julia Goodrich, Miss Rachel Haynie, and Walter L. Necker.

To make the Academy's publications more generally available, the librarian checked all major American libraries for completeness of their files of Academy publications. In all cases possible, the files were completed from the Academy's reserve stock of publications. We feel this is the best use that could be made of reserve stock, although some institutions burn excess stock or sell it as junk! The appreciative acknowledgements of these libraries are most gratifying.

## Wm. I. Lyon Bird Banding Council

Mr. Earl G. Wright recently was elected President of the Wm. I. Lyon Bird Banding Council. The Council was organized soon after the death of "Bill" Lyon, and includes banders from Evanston to Zion, but since the group meets in private homes it is for the present restricted to twenty members. There are bi-monthly meetings to discuss the problems and results of bird banding, and three open field trips each year. Mr. Louis G. Flentge is Secretary.

The Chicago Committee of the Progressive Education Association's Museum-School Relations Committee has been meeting at the Academy during the past three months. The purpose of the committee is to extend the usefulness of the museum to the school and to increase the school's use of the museum. Teachers interested in the committee should correspond with Mrs. Leota Thomas, chairman, at the Field Museum.

## Recent Visitors

Dr. Edward H. Taylor, well-known student of Mexican and Philippine herpetology from the University of Kansas, stopped at the Academy en route to the Pan-American Science Congress early in May. Our relations with Dr. Taylor have always been most cordial and we were extremely pleased to greet him at the Academy on his first visit here.

Dr. Herman S. Pepoon, author of the *Flora of the Chicago Region*, returned to the city to spend his eightieth birthday with his family, and stopped at the Academy to renew acquaintances.

Other recent scientific visitors include Dr. Arthur A. Allen of Cornell University, and Dr. Adolfo D. Holmberg, Director of the Zoological Garden and Professor at the University of Buenos Aires.

## Volunteer Assistance

During the absence of four staff members on the Arizona Expedition, Mr. Charles Vogelsang has assisted the herpetologist in the time-consuming duties of preserving and cataloging a large number of specimens. Various members of the Amateur Herpetologists Group have also occasionally rendered valuable assistance with this type of volunteer work, and the thanks of the Academy go to them.

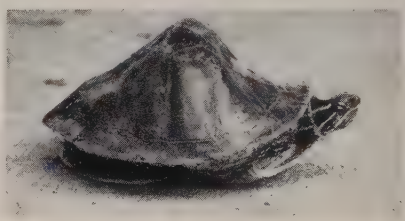
## Notes from the Field

*(Continued from page 60)*

## Hump-Backed Turtles

A very curious anomaly which is by no means rare in turtles is an excessive growth, perhaps cancroid, which deforms the dorsal shell into a rather high peak. This condition is most often found in soft-shelled turtles, and particularly frequently in Chinese examples. The anomaly, to one who has not previously seen it, is quite remarkable. Even students of reptiles have made the error of describing these freaks as new species!

I have never previously seen one of our local painted turtles *(Chrysemys picta bellii* x *marginata)* thus deformed.



The specimen illustrated, from Fox Lake, Illinois, is still living in the Lincoln Park Zoo where it has been for over a year. It will be of interest to note if this condition is found in considerable numbers of Fox Lake painted turtles, since some regions seem to produce greater numbers of this malformation than others.

—Walter L. Necker

The Chicago Naturalist is your magazine, and you are invited and urged to contribute to it. If you see anything of interest on your rambles afield, write us a note about it for "Notes from the Field."

# THE NATURALIST'S CALENDAR OF EVENTS

AMATEUR HERPETOLOGISTS' GROUP, W. L. Necker, Chicago Academy of Sciences, Diversey 5871. Meetings at Academy second Tuesday of each month, 7:30 P. M.

BIOLOGICAL PHOTOGRAPHIC ASSOCIATION. Chicago Chapter. John A. Mauerer, Secretary, 6607 Kimbark Avenue, Hydepark 2959.

CHICAGO ACADEMY OF SCIENCES, Lincoln Park at Clark and Ogden Ave., Diversey 5871.

CHICAGO AQUARIUM SOCIETY, Mr. Harmon K. Greene, Secretary, Plaza 2088. Meetings third Wednesday of each month, 8:00 P. M.

CHICAGO CACTUS SOCIETY, Mr. Frank K. Balthis, President, Garfield Park Conservatory, Kedzie 1281. Meetings last Sunday each month, Garfield Park Conservatory, 3:00 P. M.

CHICAGO ENTOMOLOGICAL SOCIETY, Mr. Alex K. Wyatt, Secretary, 5909 N. Virginia Avenue, Ravenwood 3115.

CHICAGO ORNITHOLOGICAL SOCIETY, Mr. Rudyerd Boulton, President, Field Museum, Wabash 9410. Meetings third Tuesday each month, Auditorium Building, 431 South Wabash Avenue, 8:00 P. M.

FRIENDS OF OUR NATIVE LANDSCAPE, Miss R. B. Eskil, 6016 Ingleside Avenue. Hyde Park 8313.

GEOGRAPHIC SOCIETY OF CHICAGO, 7 S. Dearborn, Randolph 5293.

ILLINOIS AUDUBON SOCIETY, Chicago Academy of Sciences, Diversey 5871.

MARQUETTE GEOLOGISTS ASSOCIATION, Mr. George J. Huss, Secretary, Canal 1828. Meetings at Academy first Saturday of each month, 8:00 P. M.

MID-WEST HORTICULTURAL SOCIETY, Administration Building, Garfield Park, Van Buren 8100. Meetings last Friday each month.

PRAIRIE CLUB, 38 S. Dearborn Street, Dearborn 3737.

STATE MICROSCOPICAL SOCIETY OF ILLINOIS, W. L. Necker, Chicago Academy of Sciences, Diversey 5871. Meetings at Academy third Friday of each month, 8:00 P. M.

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June 18 Biological Photographic Association, 950 East 59th Street, Photographic Department, 7:30 P. M.

June 29 Prairie Club, Lambert Rose Walk.

June 30 Prairie Club, short walk; Waukegan Dunes.

July 1 to Sept. 2 Mid-summer flower show at Garfield Park and Lincoln Park Conservatories, 8:00 A. M. to 10:00 P. M. daily.

July 4 Prairie Club, all day outing to Ogden Dunes.

July 7 Marquette Geologists Association, field trip.

July 9 Amateur Herpetologists Group, Auditorium, Chicago Academy of Sciences, 7:30 P. M.

July 13 and 14 Prairie Club (week-end trip) Milwaukee to Muskegon.

July 14 State Microscopical Society of Illinois, field trip.

July 16 Prairie Club, Northern Camp meeting at club office.

July 21 Prairie Club, short walk; Jackson Park.

Aug. 3 Prairie Club, picnic at Jackson Park.

Aug. 4 Marquette Geologists' Association, field trip.

Aug. 11 State Microscopical Society of Illinois, field trip.

Aug. 13 Amateur Herpetologists Group, Auditorium, Chicago Academy of Sciences, 7:30 P. M.

Aug. 15 Prairie Club, picnic at Belmont Harbor (evening stroll).

Aug. 18 Prairie Club, short walk from Geneva to Williams Bay.

Sept. 2 Prairie Club, Labor Day outing at Tremont.

Sept. 7 Marquette Geologists' Association, Auditorium, Chicago Academy of Sciences, 8:00 P. M. Members will tell of the various trips during the summer and display specimens collected.

Sept. 10 Biological Photographic Association, Municipal Tuberculosis Sanitarium, 7:30 P. M.

Sept. 10 Amateur Herpetologists Group, Auditorium, Chicago Academy of Sciences, 7:30 P. M.

Sept. 18 Chicago Aquarium Society, Chicago Room, Y. M. C. A., 19 South LaSalle Street, 8:00 P. M.

Sept. 20 State Microscopical Society of Illinois, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

Sept. 29 Prairie Club, twenty-six mile hike.


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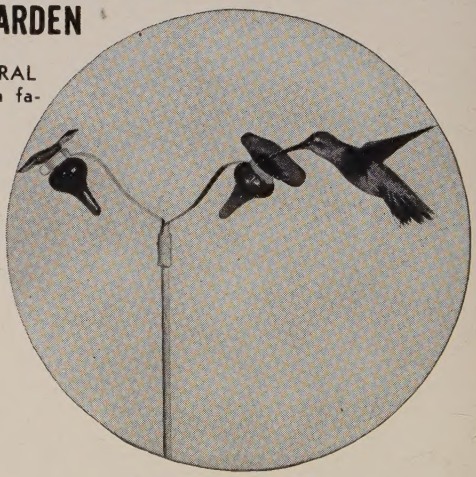

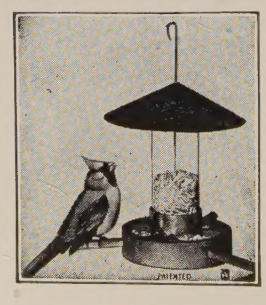

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